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| 09/670,820 | 09/28/2000 | Atsushi Shimonaka | 0717-0446P | 8768 |

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EXAMINER

LANDAU, MATTHEW C

ART UNIT PAPER NUMBER

2815

DATE MAILED: 08/28/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|-------------------------------|------------------------------------|--|
| Office Action Summary | Application No. 09/670,820 | Applicant(s) SHIMONAKA, ATSUSHI | |
| | Examiner Matthew Landau | Art Unit 2815 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) 5-8 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 9-27 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
 If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
 * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
 a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____ | 6) <input type="checkbox"/> Other: |

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities: on page 34, line 20, the phrase "semiconductor substrate 11" should read "semiconductor substrate 21 [11]".

Appropriate correction is required.

Claim Objections

2. Claim 4 is objected to because of the following informalities: the phrase "at least on a upper surface" should read "at least on an [a] upper surface". Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 3, 9, 12, 19, 20, and 23 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 3 recites the limitation "the same semiconductor substrate" in line 4 of the claim. There is insufficient antecedent basis for this limitation in the claim.

Claim 9 recites the limitation "the same material" in lines 4 and 5 of the claim. There is insufficient antecedent basis for this limitation in the claim.

In regards to claim 12, the limitation “low absorption material” renders the claim indefinite. It is unclear what is being absorbed by the low absorption material.

In regards to claim 19, it is unclear how the first wave-guiding layer can be provided between the plurality of active layers and the first wave-guiding layer.

In regards to claim 20, it is unclear how something can be optically coupled through a dielectric film. Is the dielectric film transparent?

In regards to claim 23, the limitation “equivalent refractive index” renders the claim indefinite. It is unclear to what the refractive index is equivalent.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(e) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment

by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

6. Claims 1-4, 9-12, 15-19, 21, and 23-26 are rejected under 35 U.S.C. 102(e) as being anticipated by Kudo.

In regards to claim 1, Figures 10 and 17-19 of Kudo disclose a semiconductor laser element, comprising: a semiconductor laser region (DFB laser region) in which at least one laser emission portion (ch.'s 1-8) including an active layer (MQW layer 14) for emitting light is provided; a multimode interference (MMI) region including a first wave-guiding layer (MQW layer 14), one end of the first wave-guiding being optically coupled (via optical multiplexer region) to the at least one laser emission portion (ch.'s 1-8); and an output waveguide region (optical amplifier/modulator region) including a second wave-guiding layer (MQW 14), the second wave-guiding layer being optically coupled to another end of the first wave-guiding layer, wherein the active layer of the at least one laser emission portion, the first wave-guiding layer, and the second wave-guiding layer are integrally formed. Kudo discloses the layered structure of Figure 10 is used in the embodiment shown in Figures 17-19 (see column 15, lines 20-28 and lines 45-62).

In regards to claim 2, Figures 17-19 disclose the semiconductor laser region (DFB laser region) includes a plurality of laser emission portions (ch.'s 1-8) arranged in a predetermined array.

In regards to claim 3, Figure 17 of Kudo discloses the semiconductor laser region (DFB laser region), the multimode interference region (MMI region), and the output waveguide region (amplifier/modulator region) are provided on the same semiconductor substrate 99.

In regards to claim 4, Figure 19 of Kudo discloses a first electrode 21 provided on a lower surface of the semiconductor substrate; and a second electrode 20 provided at least on, an upper surface of the semiconductor laser region.

In regards to claim 9, Kudo discloses the active layer (MQW 14 of DFB laser region) of the at least one laser emission portion (ch.'s 1-8), the first wave-guiding layer (MQW 14 of the MMI region), and the second wave-guiding layer (MQW 14 of optical amplifier/modulator region) are integrally formed of the same material (see column 15, lines 20-28).

In regards to claim 10, Figures 10 and 17-19 of Kudo disclose the semiconductor laser region (DFB laser region) includes a plurality of laser emission portions (ch.'s 1-8); and a plurality of third wave-guiding layers (MQW 14 of optical multiplexer region) for optically coupling a plurality of active layers (MQW 14 of DFB laser region) of the plurality of laser emission portions and the first wave-guiding layer (MQW 14 of MMI region) are provided between the plurality of active layers and the first wave-guiding layer.

In regards to claim 11, Kudo discloses the plurality of active layers (MQW 14 of DFB laser region), the first wave-guiding layer (MQW 14 of MMI region), and the plurality of the third wave-guiding layers (MQW 14 of optical multiplexer region) are integrally formed of the same material (see column 15, lines 20-28).

In regards to claim 12, Kudo discloses the first wave-guiding layer (MQW 14 of the MMI region) and the plurality of third wave-guiding layers (MQW 14 of optical multiplexer region) are formed of a low absorption material (see column 15, lines 25-27).

In regards to claim 15, Figures 10 and 17-19 of Kudo disclose a semiconductor laser element, comprising: a semiconductor laser region (DFB laser region) including at least one laser

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oscillation portion (ch.'s 1-8) having an active layer (MQW 14 of DFB laser region) which performs laser oscillation (see column 15, lines 38-45); a multimode interference region (MMI region) including a first wave-guiding layer (MQW 14 of MMI region), one end of the first wave-guiding layer being optically coupled to the active layer in the at least one laser oscillation portion, wherein the active layer in the at least one laser oscillation portion, and the first wave-guiding layer, are integrally formed. Kudo discloses the layered structure of Figure 10 is used in the embodiment shown in Figures 17-19 (see column 15, lines 20-28 and lines 45-62).

In regards to claim 16, Figures 17-19 disclose the semiconductor laser region (DFB laser region) includes a plurality of laser oscillation portions (ch.'s 1-8) arranged in a predetermined array.

In regards to claim 17, Figure 17 of Kudo discloses the semiconductor laser region (DFB laser region), and the multimode interference region (MMI region) are provided on the same semiconductor substrate 99.

In regards to claim 18, Figure 19 of Kudo discloses an output waveguide (optical amplifier/modulator region), from which laser light is emitted, is formed integrally with the multimode interference region (MMI region).

In regards to claim 19, Figures 10 and 17-19 of Kudo disclose the semiconductor laser region (DFB laser region) includes a plurality of laser oscillation portions (ch.'s 1-8); and the semiconductor laser element further includes a plurality of input waveguides (shown in optical multiplexer region) which have a plurality of second wave-guiding layers (MQW 14 of optical multiplexer region) for optically coupling a plurality of active layers (MQW 14 of DFB laser

region) of the plurality of laser oscillation portions and the first wave-guiding layer provided between the plurality of active layers and the first wave-guiding layer.

In regards to claim 21, Kudo discloses the first wave-guiding layer (MQW 14 of MMI region) and the plurality of second wave-guiding layers (MQW 14 of optical multiplexer region) are made of the same material having a low light absorption (see column 15, lines 25-27).

In regards to claim 23, it is inherent for a waveguide layer to have a refractive index. As best the examiner can ascertain the claimed invention, Kudo discloses each of the plurality of second wave-guiding layers (MQW 14 of optical multiplexer region) has a predetermined equivalent refractive index. Each of these layers are formed of the same material under the same conditions (see column 15, lines 20-28), therefore it is inherent that they have the same refractive index.

In regards to claim 24, Kudo discloses each of the plurality of second wave-guiding layers (MQW 14 of optical multiplexer region) have a width (see column 15, lines 6-12).

In regards to claims 25, Kudo discloses each of the plurality of second wave-guiding layers (MQW 14 of optical multiplexer region) have a width (see column 15, lines 6-12). The width of an end product cannot be compared to an imaginary, intended value. Thus, the manufacturing error with respect to the predetermined width does not patentably distinguish the claimed invention over the prior art.

In regards to claim 26, the product by process limitation "wherein the geometric pattern of the plurality of second wave-guiding layers is made by a reduction exposure method" does not patentably distinguish the claimed invention over the prior art.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 13 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kudo in view of Towe et al.

In regards to claim 13, the difference between Kudo and the claimed invention is the first wave-guiding layer and the plurality of third wave-guiding layers formed of AlGaAs. Figure 3a of Towe et al. discloses wave-guiding layers 16' formed of AlGaAs. In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Kudo by forming the first wave-guiding layer and the plurality of third wave-guiding layers from AlGaAs. The ordinary artisan would have been motivated to modify Kudo in the manner described above for the at least the purpose of selecting a semiconductor material with similar properties.

In regards to claim 22, the difference between Kudo and the claimed invention is the first wave-guiding layer and the plurality of second wave-guiding layers are made of AlGaAs. Figure 3a of Towe et al. discloses wave-guiding layers 16' formed of AlGaAs. In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Kudo by making the first wave-guiding layer and the plurality of second wave-guiding layers from AlGaAs. The ordinary artisan would have been motivated to

modify Kudo in the manner described above for the at least the purpose of selecting a semiconductor material with similar properties.

9. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kudo in view of McFarlane et al.

The difference between Kudo and the claimed invention is a dielectric film provided between the plurality of active layers and the plurality of second wave-guiding layers. Figure 3c of McFarlane et al. discloses a dielectric film 14 disposed between a laser active region 18 and a waveguide active region 8. In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Kudo by including a dielectric film between the plurality of active layers and the plurality of second wave-guiding layers. The ordinary artisan would have been motivated to modify Kudo in the manner described above for the purpose of providing a reflective surface.

10. Claims 14 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kudo in view of Mazed.

In regards claim 14, the difference between Kudo and the claimed invention is an electronic device that supplies a modulation signal to the semiconductor laser element. Mazed discloses a laser chip 10 with a modulation signal applied thereto (see column 16, lines 61-65). In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Kudo by incorporating an electronic device that supplies a modulation signal to the semiconductor laser element. The ordinary artisan would

have been motivated to modify Kudo in the manner described above for the purpose of adjusting the laser output.

In regards to claim 27, the difference between Kudo and the claimed invention is an electronic device that outputs a modulation signal to the semiconductor laser element. Mazed discloses a laser chip 10 with a modulation signal applied thereto (see column 16, lines 61-65). In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Kudo by incorporating an electronic device that outputs a modulation signal to the semiconductor laser element. The ordinary artisan would have been motivated to modify Kudo in the manner described above for the purpose of adjusting the laser output.

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew C. Landau whose telephone number is (703) 305-4396.

The examiner can normally be reached from 8:00 AM-4:30 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on (703) 308-1690. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.



Matthew C. Landau

Examiner

August 21, 2002